Troubleshooting Guide

HP t420 Thin Client

First Edition (July 2015)

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Product notice

This guide describes features that are common to most models. Some features may not be available on your computer.

About This Book

WARNING! Text set off in this manner indicates that failure to follow directions could result in bodily harm or loss of life.

CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

NOTE: Text set off in this manner provides important supplemental information.

Table of contents

1 Product features

This guide describes the features of the thin client. For a complete list of the hardware and software installed on a specific model, go to http://www.hp.com/go/quickspecs and search for your specific thin client model.

Various options are available for your thin client. For more information about available options, go to the HP website at http://www.hp.com and search for your specific thin client model.

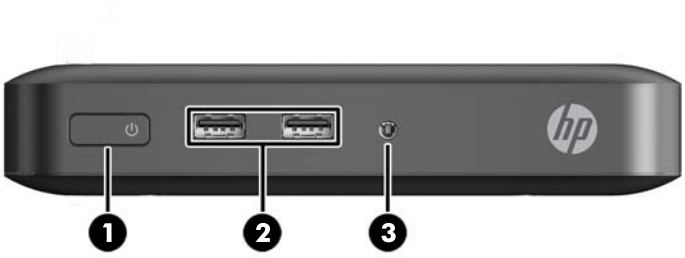
NOTE: Your computer model may look different than the model in the following illustrations.

Hardware features

- Compact 0.88 liter thin client; convenient horizontal orientation with fixed rubber feet; mount almost anywhere with an integrated VESA 100 mounting system.
- AMD GX-209JA System-on-Chip (SOC), including a 1.0 GHz dual core APU and discrete-level GPU.
- Integrated 2 GB DDR3L SDRAM system memory; 1,066 MT/s data transfer rate.
- 8 GB or 16 GB capacity flash memory storage on internal Super Speed USB 3.0 modules.
- Active thermal management monitors component operating temperatures, throttles SOC operation if appropriate, and prevents unit thermal shutdown.
- Integrated Gigabit Ethernet LAN module; rear access RJ-45 modular jack.
- Optional 802.11n 2x2 dual band Wi-Fi Adapter with Bluetooth.
- One VGA analog video output and one DVI-D digital video output.
- Two Hi-Speed USB 2.0 front access ports and two Hi-Speed USB 2.0 rear access ports. The two rear access ports are typically utilized by the keyboard and mouse.
- Front access headset jack.
- ENERGY STAR® certified and EPEAT® Gold registered in the United States. Post-consumer recycled plastics content greater than 25% total unit plastics (by weight).
- Low halogen materials.

Front panel components

For more information, go to http://www.hp.com/go/quickspecs and search for your specific thin client model to find the model-specific QuickSpecs.

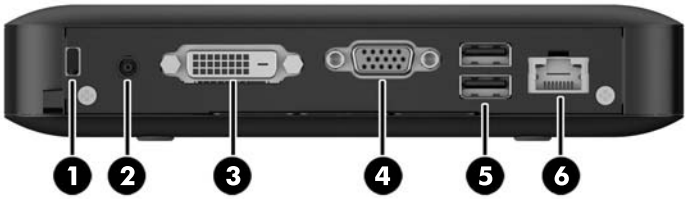


(1)		Power button	(3)		Headset jack This connector supports audio out (speakers and headphones) or a headset (with headphones and a microphone).
(2)		Hi-Speed universal serial bus (USB) 2.0 connectors (2)			

NOTE: The thin client does not include an internal PC speaker; it requires the addition of an external speaker device to produce audio.

Rear panel components

For more information, go to http://www.hp.com/go/quickspecs and search for your specific thin client model to find the model-specific QuickSpecs.



(1)		Cable lock slot	(4)		VGA connector
(2)		Power connector	(5)		Hi-Speed universal serial bus (USB) 2.0 connectors (2) These ports are typically used to connect the mouse and keyboard.
(3)		DVI-D connector	(6)		Ethernet RJ-45 connector

Removing the rubber feet

The thin client comes with rubber feet installed. The rubber feet help keep the thin client safely in place.

⚠ **CAUTION:** If you use the thin client in a horizontal orientation without the rubber feet, it may slide and result in equipment damage.

The rubber feet may be removed, if required.

Serial number location

Every thin client includes a unique serial number located as shown in the following illustration. Have this number available when contacting HP customer service for assistance.

2 Hardware changes

Warnings and cautions

Before performing upgrades be sure to carefully read all of the applicable instructions, cautions, and warnings in this guide.

⚠ **WARNING!** To reduce the risk of personal injury or equipment damage from electric shock, hot surfaces, or fire:

Disconnect the power cord from the power outlet and allow the internal system components to cool before you touch them.

Do not plug telecommunications or telephone connectors into the network interface controller (NIC) receptacles.

Do not disable the power cord grounding plug. The grounding plug is an important safety feature.

Plug the power cord into a grounded (earthed) outlet that is easily accessible at all times.

To reduce the risk of serious injury, read the *Safety & Comfort Guide*. It describes proper workstation setup, posture, and health and work habits for computer users, and provides important electrical and mechanical safety information. The *Safety & Comfort Guide* is located on the HP website at http://www.hp.com/ergo.

⚠ **WARNING!** Energized parts inside.

Disconnect power to the equipment before removing the enclosure.

Replace and secure the enclosure before re-energizing the equipment.

⚠ **CAUTION:** Static electricity can damage the electrical components of the thin client or optional equipment. Before beginning the following procedures, be sure that you are discharged of static electricity by briefly touching a grounded metal object. See Preventing electrostatic damage on page 39 for more information.

When the thin client is plugged into an AC power source, voltage is always applied to the system board. To prevent damage to internal components, you must disconnect the power cord from the power source before opening the thin client.

Removing and replacing the access panel

Removing the access panel

WARNING! To reduce the risk of personal injury or equipment damage from electric shock, hot surfaces, or fire, ALWAYS operate the thin client with the access panel in place. In addition to enhancing safety, the access panel may provide important instructions and identification information, which may be lost if the access panel is not used. DO NOT use any access panel except the one that is provided by HP for use with this thin client.

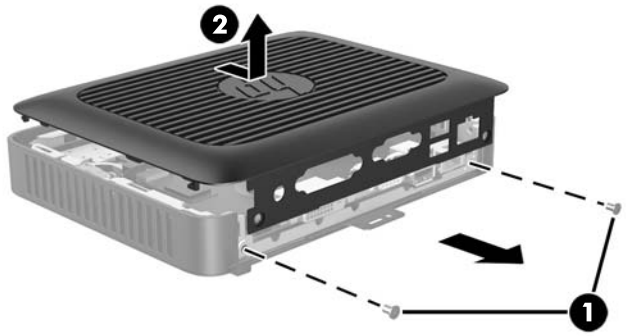
Before removing the access panel, be sure that the thin client is turned off and the power cord is disconnected from the electrical outlet.

To remove the access panel:

1. Remove/disengage any security devices that prohibit opening the thin client.
2. Remove all removable media, such as USB flash drives, from the thin client.
3. Turn off the thin client properly through the operating system, and then turn off any external devices.
4. Disconnect the power cord from the power outlet, and disconnect any external devices.

   CAUTION: Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. You must disconnect the power cord to avoid damage to the internal components of the thin client.

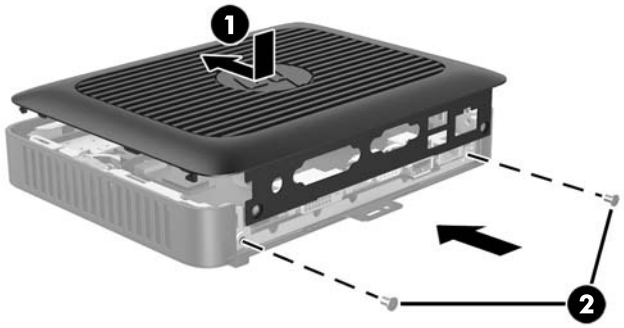
5. Lay the unit flat on a stable surface with the right side up.
6. Remove the two screws from the back I/O panel (1).
7. Slide the access panel approximately 6 mm (.24 in) toward the back of the chassis, and then lift the panel off of the thin client (2).



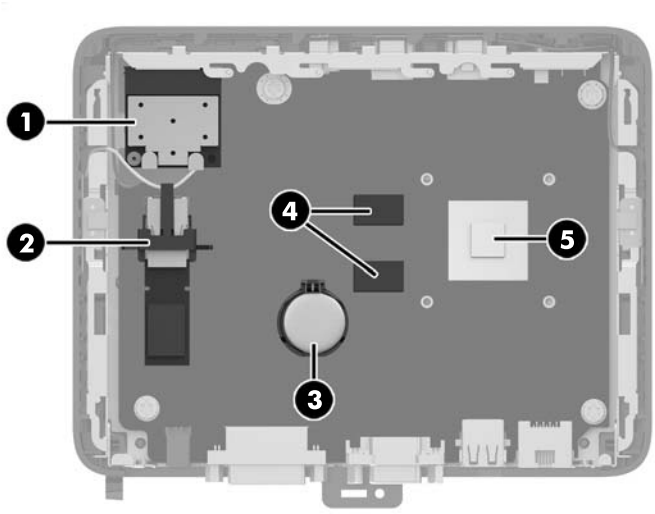
Replacing the access panel

To replace the access panel:

1. Align the tabs on each side of the access panel with the slots in the chassis. Set the access panel on the chassis, approximately 6 mm (.24 in) inside the edge of the chassis, and then slide the panel toward the front of the chassis (1) into place.
2. Fasten the two screws into the ends of the back I/O panel to secure the access panel (2).



Locating internal components



1	PCIe mini card for the Wi-Fi module	4	512 MB SDRAM memory chips This thin client has four 512 MB SDRAM memory chips soldered to the system board: two on this side and two directly below them on the other side.
2	USB 3.0 module holder with module installed	5	System on a Chip (SOC) The SOC is soldered to the system board.
3	Battery		

Removing and replacing the USB 3.0 flash drive

Before returning the thin client to HP for exchange, you may choose to remove and safeguard the USB 3.0 flash drive.

Removing the USB 3.0 flash drive

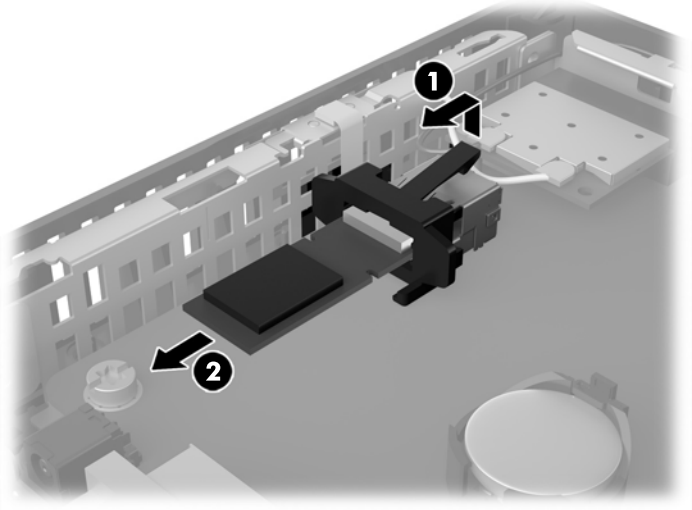
⚠ **WARNING!** Before removing the access panel, be sure that the thin client is turned off and the power cord is disconnected from the electrical outlet.

To remove the USB 3.0 flash drive, perform the following steps:

1. Remove/disengage any security devices that prohibit opening the thin client.
2. Remove all removable media, such as USB flash drives, from the thin client.
3. Turn off the thin client properly through the operating system, and then turn off any external devices.
4. Disconnect the power cord from the power outlet, and disconnect any external devices.

   ⚠ **CAUTION:** Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. You must disconnect the power cord to avoid damage to the internal components of the thin client.

5. Lay the thin client down with the right side up.
6. Remove the thin client access panel. See Removing the access panel on page 6.
7. Locate the USB 3.0 flash drive on the system board.
8. Lift the USB holder and push it toward the USB 3.0 flash drive (1).
9. Carefully pull the flash drive out of the socket (2).



   Store the USB 3.0 flash drive carefully until it can be installed in the returned thin client.

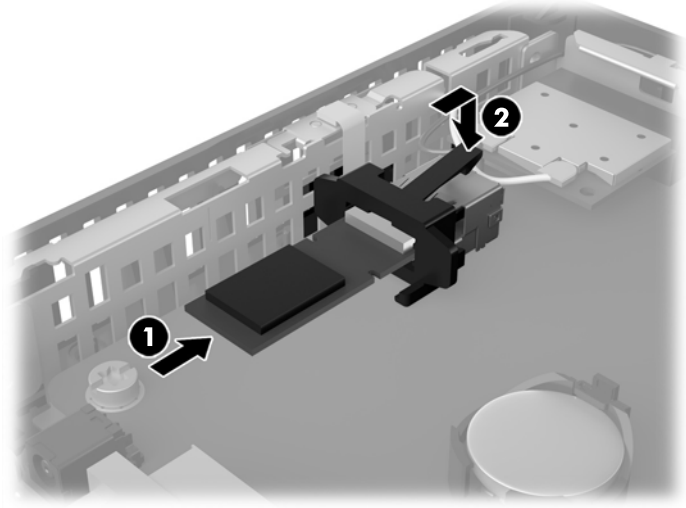
10. Replace and secure the access panel. See Replacing the access panel on page 7.

Replacing the USB 3.0 flash drive

⚠ **WARNING!** Before removing the access panel, be sure that the thin client is turned off and the power cord is disconnected from the electrical outlet.

To Install the USB 3.0 flash drive, perform the following steps:

1. Lay the thin client down with the right side up.
2. Remove the thin client access panel. See Removing the access panel on page 6.
3. Locate the USB 3.0 flash drive holder on the system board.
4. Lift the USB holder and push it forward to expose the USB socket.
5. Slide the USB 3.0 flash drive firmly into the USB socket (1).
6. Push the USB holder back and press it down (2) to lock the USB 3.0 flash drive in place.



7. Replace and secure the access panel. See Replacing the access panel on page 7.

Removing and replacing the battery

⚠ **WARNING!** Before removing the access panel, be sure that the thin client is turned off and the power cord is disconnected from the electrical outlet.

To remove and replace the battery:

1. Remove/disengage any security devices that prohibit opening the thin client.
2. Remove all removable media, such as USB flash drives, from the thin client.
3. Turn off the thin client properly through the operating system, and then turn off any external devices.
4. Disconnect the power cord from the power outlet, and disconnect any external devices.

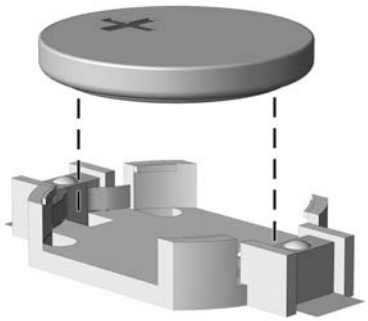
   ⚠ **CAUTION:** Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. You must disconnect the power cord to avoid damage to the internal components of the thin client.

5. Remove the thin client access panel. See Removing the access panel on page 6.
6. Locate the battery and battery holder on the system board.
7. Depending on the type of battery holder on the system board, complete the following instructions to replace the battery.

   Type 1

   a. Lift the battery out of its holder.

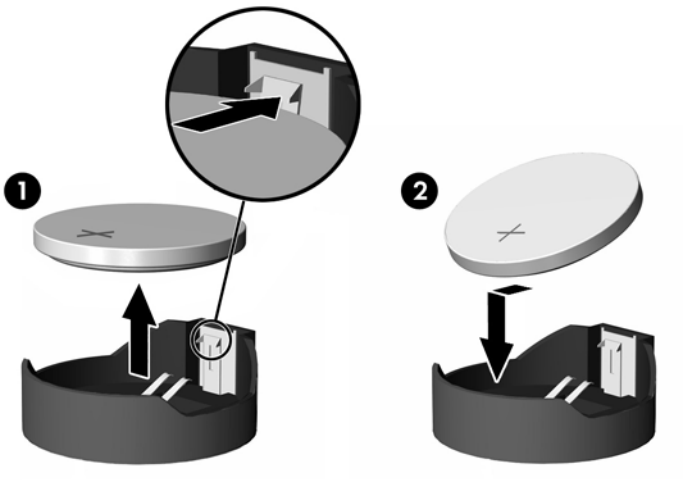
   b. Slide the replacement battery into position, positive side up. The battery holder automatically secures the battery in the proper position.



   Type 2

   a. To release the battery from its holder, squeeze the metal clamp that extends above one edge of the battery. When the battery pops up, lift it out (1).

b. To insert the new battery, slide one edge of the replacement battery under the holder's lip with the positive side up. Push the other edge down until the clamp snaps over the other edge of the battery (2).



8. Replace and secure the access panel. See Replacing the access panel on page 7.
9. Replace the thin client stand.
10. Reconnect the power cord and turn on the thin client.
11. Lock any security devices that were disengaged when the thin client cover or access panel was removed.

HP encourages customers to recycle used electronic hardware, HP original print cartridges, and rechargeable batteries. For more information about recycling programs, go to http://www.hp.com and search for "recycle".

Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP, an authorized HP partner, or their agents.

The Taiwan EPA requires dry battery manufacturing or importing firms, in accordance with Article 15 or the Waste Disposal Act, to indicate the recovery marks on the batteries used in sales, giveaways, or promotions. Contact a qualified Taiwanese recycler for proper battery disposal.

A Computer Setup (F10) Utility, BIOS Settings

Computer Setup (F10) Utilities

Use Computer Setup (F10) Utility to do the following:

- Change factory default settings.
- Set the system date and time.
- Set, view, change, or verify the system configuration, including settings for processor, graphics, memory, audio, storage, communications, and input devices.
- Modify the boot order of bootable devices such as solid-state drives or USB flash media devices.
- Select Post Messages Enabled or Disabled to change the display status of Power-On Self-Test (POST) messages. Post Messages Disabled suppresses most POST messages, such as memory count, product name, and other non-error text messages. If a POST error occurs, the error is displayed regardless of the mode selected. To manually switch to Post Messages Enabled during POST, press any key (except F1 through F12).
- Enter the Asset Tag or property identification number assigned by the company to this computer.
- Enable the power-on password prompt during system restarts (warm boots) as well as during power-on.
- Establish a setup password that controls access to the Computer Setup (F10) Utility and the settings described in this section.
- Secure integrated I/O functionality, including the USB, audio, or embedded NIC, so that they cannot be used until they are unsecured.

Using Computer Setup (F10) Utilities

Computer Setup can be accessed only by turning the computer on or restarting the system. To access the Computer Setup Utilities menu, complete the following steps:

1. Turn on or restart the computer.
2. Press either Esc or F10 while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.

   Pressing Esc displays a menu that allows you to access different options available at startup.

   NOTE: If you do not press Esc or F10 at the appropriate time, you must restart the computer and again press Esc or F10 when the monitor light turns green to access the utility.

   NOTE: You can select the language for most menus, settings, and messages using the Language Selection option using the F8 key in Computer Setup.
3. If you pressed Esc, press F10 to enter Computer Setup.
4. A choice of five headings appears in the Computer Setup Utilities menu: File, Storage, Security, Power, and Advanced.

5. Use the arrow (left and right) keys to select the appropriate heading. Use the arrow (up and down) keys to select the option you want, then press Enter. To return to the Computer Setup Utilities menu, press Esc.

6. To apply and save changes, select **File** > **Save Changes and Exit**.

   - If you have made changes that you do not want applied, select **Ignore Changes and Exit**.
   - To reset to factory settings, select **Apply Defaults and Exit**. This option will restore the original factory system defaults.

⚠ **CAUTION:** Do NOT turn the computer power OFF while the BIOS is saving the Computer Setup (F10) changes because the CMOS could become corrupted. It is safe to turn off the computer only after exiting the F10 Setup screen.

Heading	Table
File	Computer Setup—File on page 15
Storage	Computer Setup—Storage on page 16
Security	Computer Setup—Security on page 17
Power	Computer Setup—Power on page 18
Advanced	Computer Setup—Advanced on page 19

Computer Setup—File

NOTE: Support for specific Computer Setup options may vary depending on the hardware configuration.

Option	Description
System Information	Lists: • Manufacturer • Product name • SKU number (some models) • Serial number • Asset Tag • Ownership Tag • System Board ID • System Board CT Number • BIOS Revision • BIOS Date • Processor type • Processor speed • Memory size/speed, number of channels (single or dual) (if applicable) • Integrated MAC • WLAN FCC ID
About	Displays copyright notice.
Set Time and Date	Allows you to set system time and date.
Flash System ROM	Allows you to update the system ROM with a BIOS image file located on removable media.
Default Setup	**Save Current Settings as Default** Lets the user store the current settings of the Setup options selected by the user as the default values for all future default loading. **Restore Factory Settings as Default** Lets the user select the values of the Setup options preset by the BIOS as the default values for all future default loading.
Apply Defaults and Exit	Loads the original factory system configuration settings for use by a subsequent “Apply Defaults and Exit” action.
Ignore Changes and Exit	Exits Computer Setup without applying or saving any changes.
Save Changes and Exit	Saves changes to system configuration or default settings and exits Computer Setup.

Computer Setup—Storage

Option	Description
Device Configuration	Lists all installed BIOS-controlled storage devices. When a device is selected, detailed information and options are displayed. The following options may be presented: **Hard Disk**: Size, model, firmware version, serial number.
Storage Options	**External USB Storage Boot** Lets you decide when to boot from external USB storage (before or after the internal USB storage) or disable the ability to boot from USB external storage. **Legacy Support** Allows you to turn off all legacy support on the computer, including booting to DOS, running legacy graphics cards, booting to legacy devices, and so on. If set to disable, legacy boot options in **Storage > Boot Order** are not displayed. Default is enabled.
Boot Order	Allows you to: • Specify the order in which EFI boot sources (such as a internal drive, USB hard drive, or USB optical drive) are checked for a bootable operating system image. Each device on the list may be individually excluded from or included for consideration as a bootable operating system source. EFI boot sources always have precedence over legacy boot sources. • Specify the order in which legacy boot sources (such as a network interface card, internal drive, or USB optical drive) are checked for a bootable operating system image. Each device on the list may be individually excluded from or included for consideration as a bootable operating system source. • Specify the order of attached hard drives. The first hard drive in the order will have priority in the boot sequence and will be recognized as drive C (if any devices are attached). **NOTE:** You can use F5 to disable individual boot items, as well as disable EFI boot and/or legacy boot. MS-DOS drive lettering assignments may not apply after a non-MS-DOS operating system has started. **Shortcut to Temporarily Override Boot Order** To boot **one time** from a device other than the default device specified in Boot Order, restart the computer and press Esc (to access the boot menu) and then F9 (Boot Order), or only F9 (skipping the boot menu) when the monitor light turns green. After POST is completed, a list of bootable devices is displayed. Use the arrow keys to select the preferred bootable device and press Enter. The computer then boots from the selected non-default device for this one time.

Computer Setup—Security

NOTE: Support for specific Computer Setup options may vary depending on the hardware configuration.

Table A-1 Computer Setup—Security

Option	Description
Setup Password	Allows you to set and enable a setup (administrator) password. **NOTE:** If the setup password is set, it is required to change Computer Setup options, flash the ROM, and make changes to certain plug and play settings under Windows.
Power-On Password	Allows you to set and enable a power-on password. The power-on password prompt appears after a power cycle or reboot. If the user does not enter the correct power-on password, the unit will not boot.
Password Options (This selection appears only if a power-on password or setup password is set.)	Allows you to enable/disable: Stringent Password: This item only selectable while Setup Password is set. **NOTE:** Disable the on-board password jumper's (E49) ability to reset the setup passwords. When enabling Stringent Password, losing the passwords may render the system permanently unusable.
Device Security	Allows you to set Device Available/Device Hidden (default is Device Available) for: • System audio • Network controller • Internal storage • Mini PCIe Wireless LAN Device
USB Security	Allows you to set enabled/disabled (default is Enabled) for: • Front USB Ports ◦ USB Port 2 ◦ USB Port 3 • Rear USB Ports ◦ USB Port 0 ◦ USB Port 1
Slot Security	Allows you to disable the PCI Express slot and Mini Card Slot. Default is enabled. • Mini Card Slot
Network Boot	Enables/disables the computer's ability to boot from an operating system installed on a network server. Default is enabled. **Remote Wakeup Boot Source** (Local Hard Drive/Remote Server)
System IDs	Lists the following information: • Asset tag (18-byte identifier), a property identification number assigned by the company to the computer. • Universal Unique Identifier (UUID) number. The UUID can only be updated if the current chassis serial number is invalid. (These ID numbers are normally set in the factory and are used to uniquely identify the system.) • Product name • Serial Number • Family Name

Table A-1 Computer Setup—Security (continued)

	• Ownership Tag • Feature Byte • Build ID • Keyboard
System Security	Data Execution Prevention (enable/disable) - Helps prevent operating system security breaches. Default is enabled. Virtualization Technology (enable/disable). Controls the virtualization features of the processor. Changing this setting requires turning the computer off and then back on. Default is disabled.
Secure Boot Configuration	The options on this setup page are only for Windows 8 and other operating systems that support Secure Boot. Changing the default setting of the setup options on this page for operating system that do not support secure boot may prevent the system from booting successfully. Legacy Support (Enable/Disable). Enable or disable the legacy operating system support (Windows Embedded Standard 7 and HP Thin-Pro). Secure Boot (Enable/Disable). Only when the Legacy Support set to “Disable”, this item can be set to Enabled. This item is for Secure Boot flow control. Secure boot is possible only if system run in user mode. Key Management • Clear Secure Boot Keys (Clear/Don’t Clear). Lets you clear the Secure Boot Key. • Key ownership (HP keys/ Customer keys). Lets you change the keys of different owners. Fast Boot (Enable/Disable). Enable Fast Boot cause system boot by initializing a minimal set of devices which is required to launch active boot option. This option has no effect for BBS boot options.

Computer Setup—Power

NOTE: Support for specific Computer Setup options may vary depending on the hardware configuration.

Table A-2 Computer Setup—Power

Option	Description
OS Power Management	Runtime Power Management (Enable/Disable) Idle Power Savings (Extended/Normal)
Hardware Power Management	S5 Maximum Power Savings – Turns off power to all nonessential hardware when system is off. S5 Wake on LAN (Disable/Enable). Permits the user to control whether the system should wake from S5 if a magic packet is received by NIC.

Computer Setup—Advanced

NOTE: Support for specific Computer Setup options may vary depending on the hardware configuration.

Table A-3 Computer Setup—Advanced (for advanced users)

Option	Heading
Power-On Options	Allows you to set: • POST messages (enable/disable). Default is disabled. • After Power Loss (off/on/previous state). Default is Power off. Setting this option to: ◦ Power off—causes the computer to remain powered off when power is restored. ◦ Power on—causes the computer to power on automatically as soon as power is restored. ◦ Previous state—causes the computer to power on automatically as soon as power is restored, if it was on when power was lost. **NOTE:** If you turn off power to the computer using the switch on a power strip, you will not be able to use the suspend/sleep feature or the Remote Management features. • POST Delay (in seconds). Enabling this feature will add a user-specified delay to the POST process. This delay is sometimes needed for hard disks on some PCI cards that spin up very slowly, so slowly that they are not ready to boot by the time POST is finished. The POST delay also gives you more time to select F10 to enter Computer (F10) Setup. Default is None.
BIOS Power-On	Allows you to set the computer to turn on automatically at a time you specify.
Bus Options	On some models, allows you to enable or disable: • PCI SERR# Generation. Default is enabled. • PCI VGA Palette Snooping, which sets the VGA palette snooping bit in PCI configuration space; only needed when more than one graphics controller is installed. Default is disabled.
Device Options	Allows you to set: • POST Buzzer Volume (Soft/Loud/Mute). Default is Soft. • Num Lock State at Power-On (off/on). Default is off. • Multi-Processor (Enable, Disable) Default Enabled; Use this option to disable multiprocessor support under the OS. • NIC Option ROM Download (PXE, disabled). The BIOS contains an embedded NIC option ROM to allow the unit to boot through the network to a PXE server. This is typically used to download a corporate image to a hard drive. The NIC option ROM takes up memory space below 1 MB commonly referred to as DOS Compatibility Hole (DCH) space. This space is limited. This F10 option will allow users to disable the downloading of this embedded NIC option ROM thus giving more DCH space for additional PCI cards which may need option ROM space. The default will be to have the NIC option-ROM-enabled. Default is PXE. • Integrated Graphics (Auto/Force). Use this option to manage integrated (UMA) graphics memory allocation. The value you choose allocates memory permanently to graphics and is unavailable to the operating system. For example, if you set this value to 512 MB on a system with 2 GB of RAM, the system always allocates 512 MB for graphics and the other 1.5 GB for use by the BIOS and operating system. Default is Auto which sets memory allocation to 256 MB. If you select Force, the UMA Frame Buffer Size option displays, which lets you set the UMA memory size allocation between 64 MB and 512 MB. Default is 256 MB.

Changing BIOS Settings from the HP BIOS Configure Utility (HPBCU)

Some BIOS settings may be changed locally within the operating system without having to go through the F10 utility. This table identifies the items that can be controlled with this method.

BIOS Setting	Default Value	Other Values
Language	English	Francais, Espanol, Deutsch, Italiano, Dansk, Suomi, Nederlands, Norsk, Portugues, Svenska, Japanese, Simplified Chinese
Set Time	00:00	00:00:23:59
Set Day	01/01/2011	01/01/2011 to current date
Default Setup	None	Save Current Settings as Default, Restore Factory Settings as Default
Apply Defaults and Exit	Disable	Enable
Setup Browse Mode	Enable	Disable
USB Storage Boot	Enable	Disable
System Audio	Device available	Device hidden
Network Controller	Device available	Device hidden
Mini PCIe Wireless LAN Device	Enable	Disable
Front USB Ports	Enable	Disable
Rear USB Ports	Enable	Disable
Front USB Port 8 & 9	Enable	Disable
Rear USB Port 0, 1, 2, & 3	Enable	Disable
USB Port Configuration	Auto	Force 2.0
Mini Card Slot	Enable	Disable
Network Boot	Enable	Disable
Remote Wakeup Boot Source	Local Hard Drive	Remote Server
Data Execution Prevention	Enable	Disable
Virtualization Technology	Disable	Enable
Legacy Support	Enable	Disable (Note: The default value may be varied depends on the OS)
Secure Boot	Disable	Enable (Note: The default value may be varied depends on the OS)
Clear Secure Boot Keys	Don't Clear	Clear
Key Ownership	HP Keys	Custom Keys
Fast Boot	Disable	Enable (Note: The default value may be varied depends on the OS)
Runtime Power Management	Enable	Disable
Idle Power Savings	Extended	Normal
S5 Maximum Power Savings	Disable	Enable
S5 Wake on LAN	Disable	Enable

POST Messages	Disable	Enable
After Power Loss	Off	On, Previous State
POST Delay (in seconds)	None	5, 10, 15, 20, 60
Power on Sunday – Saturday	Disable	Enable
Power on Time (hh:mm)	00:00	00:00:23:59
PCI SERR# Generation	Enable	Disable
PCI VGA Palette Snooping	Disable	Enable
Num Lock State at Power- On	On	Off
Integrated Graphics	Auto	Disable, Force
UMA Frame Buffer Size	512M	32M, 64M, 128M, 256M, 1G
Multi-Processor	Enable	Disable
Internal Speaker	Enable	Disable
NIC Option ROM Download	PXE	Disable

B Diagnostics and Troubleshooting

LEDs

LED	Status
Power LED Off	When the unit is plugged into the wall socket and the Power LED is off, the unit is powered off. However, the network can trigger a Wake On LAN event in order to perform management functions.
Power LED On	Displays during boot sequence and while the unit is on. During boot sequence, hardware initialization is processed and startup tests are performed on the following: • Processor initialization • Memory detection and initialization • Video detection and initialization **NOTE:** If one of the tests fails, the unit will simply stop, but the LED will stay on. If the video test fails, the unit beeps. There are no messages sent to video for any of these failed tests. **NOTE:** After the video is initialized, anything that fails will have an error message.
NOTE: RJ-45 LEDs are located inside the RJ-45 connector on the top, rear panel of the thin client. The LEDs are visible when the connector is installed. Blinking green indicates network activity, and amber indicates a 100MB speed connection.	

Wake-on LAN

Wake-on LAN (WOL) allows a computer to be turned on or resumed from sleep or hibernation state by a network message. You can enable or disable WOL in Computer Setup using the **S5 Maximum Power Savings** setting.

To enable or disable WOL:

1. Turn on or restart the computer.
2. Press either Esc or F10 while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.

   NOTE: If you do not press Esc or F10 at the appropriate time, you must restart the computer and again press Esc or F10 when the monitor light turns green to access the utility.
3. If you pressed Esc, press F10 to enter Computer Setup.
4. Navigate to **Power > Hardware Power Management**.
5. Set **S5 Maximum Power Savings** as follows:
   - Disable WOL = Enabled
   - Enable WOL = Disabled
6. Press F10 to accept any changes.
7. Select **File** > **Save Changes and Exit**.

Power-On Sequence

At power-on, the flash boot block code initializes the hardware to a known state, then performs basic power-on diagnostic tests to determine the integrity of the hardware. Initialization performs the following functions:

1. Initializes CPU and memory controller.
2. Initializes and configures all PCI devices.
3. Initializes VGA software.
4. Initializes the video to a known state.
5. Initializes USB devices to a known state.
6. Performs power-on diagnostics. For more information, see “Power-On Diagnostic Tests”.
7. The unit boots the operating system.

Resetting the Setup and power-on Passwords

You can reset the Setup and Power-on passwords as follows:

1. Turn off the computer and disconnect the power cord from the power outlet.
2. Remove the side access panel and the metal side cover.
3. Remove the password jumper from the system board header labeled PSWD/E49.
4. Replace the metal side cover and the side access panel.
5. Connect the computer to AC power, and then turn on the computer.
6. Turn off the computer and disconnect the power cord from the power outlet.
7. Remove the side access panel and the metal side cover.
8. Replace the password jumper.
9. Replace the metal side cover and the side access panel.

Power-On Diagnostic Tests

The Power-on diagnostics performs basic integrity tests of the hardware to determine its functionality and configuration. If a diagnostic test fails during hardware initialization the unit simply stops. There are no messages sent to video.

NOTE: You may try to restart the unit and run through the diagnostic tests a second time to confirm the first shutdown.

The following table lists the tests that are performed on the unit.

Test	Description
Boot Block Checksum	Tests boot block code for proper checksum value
DRAM	Simple write/read pattern test of the first 640k of memory
Serial Port	Tests the serial port using simple port verification test to determine if ports are present
Timer	Tests timer interrupt by using polling method
RTC CMOS battery	Tests integrity of RTC CMOS battery
NAND flash device	Tests for proper NAND flash device ID present

Interpreting POST Diagnostic Front Panel LEDs and Audible Codes

This section covers the front panel LED codes as well as the audible codes that may occur before or during POST that do not necessarily have an error code or text message associated with them.

WARNING! When the computer is plugged into an AC power source, voltage is always applied to the system board. To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet and allow the internal system components to cool before touching.

NOTE: Recommended actions in the following table are listed in the order in which they should be performed.

Not all diagnostic lights and audible codes are available on all models.

Table B-1 Diagnostic Front Panel LEDs and Audible Codes

Activity	Beeps	Possible Cause	Recommended Action
White Power LED On.	None	Computer on.	None
White Power LED flashes every two seconds.	None	Computer in Suspend to RAM mode (some models only) or normal Suspend mode.	None required. Press any key or move the mouse to wake the computer.
Red Power LED flashes two times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	2	Processor thermal protection activated: A fan may be blocked or not turning. OR	1. Ensure that the computer air vents are not blocked and the processor cooling fan is plugged in and running, if equipped. 2. Contact an authorized reseller or service provider.

Table B-1 Diagnostic Front Panel LEDs and Audible Codes (continued)

Activity	Beeps	Possible Cause	Recommended Action
		The heat sink/fan assembly is not properly attached to the processor. OR The unit has vents blocked or is in a location where the ambient temperature is too high.	
Red Power LED flashes four times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	4	Power failure (power supply is overloaded). OR The incorrect external power supply adapter is being used on the unit.	1. Check if a device is causing the problem by removing ALL attached devices. Power on the system. If the system enters the POST, then power off and replace one device at a time and repeat this procedure until failure occurs. Replace the device that is causing the failure. Continue adding devices one at a time to ensure all devices are functioning properly. 2. Replace the power supply. 3. Replace the system board.
Red Power LED flashes five times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	5	Pre-video memory error.	**CAUTION:** To avoid damage to the memory modules or the system board, you must unplug the computer power cord before attempting to reseat, install, or remove a memory module. 1. Reseat memory modules. 2. Replace memory modules one at a time to isolate the faulty module. 3. Replace third-party memory with HP memory. 4. Replace the system board.
Red Power LED flashes six times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	6	Pre-video graphics error.	For systems with a graphics card: 1. Reseat the graphics card. 2. Replace the graphics card. 3. Replace the system board. For systems with integrated graphics, replace the system board.
Red Power LED flashes eight times, once every second, followed by a two second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	8	Invalid ROM based on bad checksum.	1. Reflash the system ROM with the latest BIOS image using the BIOS Recovery procedure. 2. Replace the system board.
System does not power on and LEDs are not flashing.	None	System unable to power on.	Press and hold the power button for less than 4 seconds. If the hard drive LED turns white, the power button is working correctly. Try the following: 1. Remove the power cord from the computer. 2. Open the computer and press the yellow CMOS button on the system board for 4 seconds (located near the front USB ports).

Table B-1 Diagnostic Front Panel LEDs and Audible Codes (continued)

Activity	Beeps	Possible Cause	Recommended Action
			3. Verify that the AC cord is plugged into the power supply. 4. Close the unit and reattach the power cord. 5. Try to power on the computer. 6. Replace the unit.

POST Numeric Codes and Text Messages

This section covers those POST errors that have numeric codes associated with them. The section also includes some text messages that may be encountered during POST.

NOTE: The computer will beep once after a POST text message is displayed on the screen.

Table B-2 Numeric Codes and Text Messages

Control panel message	Description	Recommended action
103-System Board Failure	DMA or timers.	1. Clear CMOS. 2. Remove expansion boards. 3. Replace the system board.
110-Out of Memory Space for Option ROMs	Recently added PCI expansion card contains an option ROM too large to download during POST.	1. If a PCI expansion card was recently added, remove it to see if the problem remains. 2. In Computer Setup, set **Advanced** > **Device Options** > **NIC PXE Option ROM Download** to **DISABLE** to prevent PXE option ROM for the internal NIC from being downloaded during POST to free more memory for an expansion card's option ROM. Internal PXE option ROM is used for booting from the NIC to a PXE server.
161-Real-Time Clock Power Loss	Invalid time or date in configuration memory. RTC (real-time clock) battery may need to be replaced.	Reset the date and time under **Control Panel** (Computer Setup can also be used). If the problem persists, replace the RTC battery. See the Removal and Replacement section for instructions on installing a new battery, or contact an authorized dealer or reseller for RTC battery replacement.
164-MemorySize Error	Memory amount has changed since the last boot (memory added or removed).	Press the F1 key to save the memory changes.
201-Memory Error	RAM failure.	1. Ensure memory modules are correctly installed. 2. Verify proper memory module type. 3. Remove and replace the identified faulty memory module(s).

Table B-2 Numeric Codes and Text Messages (continued)

Control panel message	Description	Recommended action
		4. If the error persists after replacing memory modules, replace the system board.
214-DIMM Configuration Warning	Populated DIMM Configuration is not optimized.	Rearrange the DIMMs so that each channel has the same amount of memory.
301-Keyboard Error	Keyboard failure.	1. Reconnect keyboard with computer turned off. 2. Check connector for bent or missing pins. 3. Ensure that none of the keys are depressed. 4. Replace keyboard.
510-Flash Screen Image Corrupted	Flash Screen image has errors.	Reflash the system ROM with the latest BIOS image.
512-Chassis, Rear Chassis, or Front Chassis Fan not Detected	Chassis, rear chassis, or front chassis fan is not connected or may have malfunctioned.	1. Reseat chassis, rear chassis, or front chassis fan. 2. Reseat fan cable. 3. Replace chassis, rear chassis, or front chassis fan.
513-Front Chassis fan not detected	Front chassis fan is not connected or may have malfunctioned.	1. Reseat front chassis fan. 2. Reseat fan cable. 3. Replace front chassis fan.
912-Computer Cover Has Been Removed Since Last System Startup	Computer cover was removed since last system startup.	No action required.
921-Device in PCI Express slot failed to initialize	There is an incompatibility/problem with this device and the system or PCI Express Link could not be retrained to an x1.	Try rebooting the system. If the error reoccurs, the device may not work with this system
1720-SMART Hard Drive Detects Imminent Failure	Hard drive is about to fail. (Some hard drives have a hard drive firmware patch that will fix an erroneous error message.)	1. Determine if hard drive is giving correct error message. Run the Drive Protection System test using F2 Diagnostics. 2. Apply hard drive firmware patch if applicable. (Available at http://www.hp.com/support.) 3. Back up contents and replace hard drive.
Invalid Electronic Serial Number	Electronic serial number is missing.	Enter the correct serial number in Computer Setup.
Network Server Mode Active and No Keyboard Attached	Keyboard failure while Network Server Mode enabled.	1. Reconnect keyboard with computer turned off. 2. Check connector for bent or missing pins. 3. Ensure that none of the keys are depressed. 4. Replace keyboard.

Troubleshooting

Basic Troubleshooting

If the thin client is experiencing operating problems or will not power on, review the following items.

Table B-3 Power-On Troubleshooting

Issue	Procedures
The thin client unit is experiencing operating problems.	Ensure that the following connectors are securely plugged into the thin client unit: Power connector, keyboard, mouse, network RJ-45 connector, monitor
The thin client unit does not power on.	1. Verify that the power supply is good by installing it on a known working unit and testing it. If the power supply does not work on the test unit, replace the power supply. 2. If the unit does not work properly with the replaced power supply, have the unit serviced.
The thin client unit powers on and displays a splash screen, but does not connect to the server.	1. Verify that the network is operating and the network cable is working properly. 2. Verify that the unit is communicating with the server by having the System Administrator ping the unit from the server: • If the thin client pings back, then the signal was accepted and the unit is working. This indicates a configuration issue. • If the thin client does not ping back and the thin client does not connect to the server, re-image the unit.
No link or activity on the network RJ-45 LEDs or the LEDs do not illuminate blinking green after powering on the thin client unit. (The network LEDs are located inside the RJ-45 connector on the top, rear panel of the thin client. Indicator lights are visible when the connector is installed.)	1. Verify that the network is not down. 2. Make sure the RJ-45 cable is good by installing the RJ-45 cable onto a known working device—if a network signal is detected then the cable is good. 3. Verify the power supply is good by replacing the power cable to the unit with a known working power supply cable and testing it. 4. If network LED's still do not light and you know the power supply is good, then re-image the unit. 5. If network LED's still do not light, run the IP configuration procedure. 6. If network LED's still do not light, have the unit serviced.
A newly connected unknown USB peripheral does not respond or USB peripherals connected prior to the newly connected USB peripheral will not complete their device actions.	An unknown USB peripheral may be connected and disconnected to a running platform as long as you do not reboot the system. If problems occur, disconnect the unknown USB peripheral and reboot the platform.
Video does not display.	1. Verify that the monitor brightness is set to a readable level. 2. Verify the monitor is good by connecting it to a known working computer and ensure its front LED turns green (assuming the monitor is Energy Star compliant). If the monitor is defective, replace it with a working monitor and repeat testing. 3. Re-image the thin client unit and power on the monitor again. 4. Test the thin client unit on a known working monitor. If the monitor does not display video, replace the thin client unit.

Diskless (No-Flash) Unit Troubleshooting

Because there is no ATA Flash in this model the boot priority sequence is:

- USB device
- PXE

1. When the unit boots, the monitor should display the following information:

Table B-4 Diskless Unit Troubleshooting

Item	Information	Action
MAC Address	NIC portion of the system board is OK	If no MAC Address, the system board is at fault. Contact the Call Center for service.
GUID	General system board information	If no GUID information, the system board is at fault and should be replaced.
Client ID	Information from server	If no Client ID information there is no network connection. This may be caused by a bad cable, the server is down, or a bad system board. Contact the Call Center for service for the bad system board.
MASK	Information from server	If no MASK information there is no network connection. This may be caused by a bad cable, the server is down, or a bad system board. Contact the Call Center for service for the bad system board.
DHCP IP	Information from server	If no DHCP IP information there is no network connection. This may be caused by a bad cable, the server is down, or a bad system board. Contact the Call Center for service for the bad system board.

If you are running in an Microsoft RIS PXE environment go to step 2.

If you are running in a Linux environment go to step 3.

2. If you are running in a Microsoft RIS PXE environment press the F12 key to activate the network service boot as soon as the DHCP IP information appears on the screen.

   If the unit does not boot to the network the server is not configured to PXE.

   If you missed the F12 cue, the system will try to boot to the ATA flash that is not present. The message on the screen will read: **ERROR: Non-system disk or disk error. Replace and press any key when ready.**

   Pressing any key will restart the boot cycle.

3. If you are running in a Linux environment an error message will appear on the screen if there is no Client IP. **ERROR: Non-system disk or disk error. Replace and press any key when ready.**

Configuring a PXE Server

NOTE: All PXE software is supported by authorized service providers on a warranty or service contract basis. Customers that call the HP Customer Service Center with PXE issues and questions should be referred to their PXE provider for assistance.

Additionally, refer to the following:

– For Windows 2008 R2: http://support.microsoft.com/kb/891275

– For Windows 2012: http://technet.microsoft.com/en-us/library/cc766320(WS.10).aspx

The services listed below must be running, and they may be running on different servers:

1. Domain Name Service (DNS)
2. Remote Installation Services (RIS)

NOTE: Active Directory DHCP is not required, but is recommended.

C HP ThinUpdate (add-on only)

HP ThinUpdate is an image update and recovery tool that quickly and easily downloads an image to a USB flash drive for deployment. The tool can either be installed on the thin client itself or on a standard desktop or notebook computer.

To use HP ThinUpdate:

1. In the Control Panel, click **HP ThinUpdate**.
2. Select the platform, operating system, and image version.

NOTE: You can view the release notes for the selected image by clicking **Release Notes**.

3. Insert a USB flash drive that is larger than the size specified in the Summary pane. The required size varies depending on the image.
4. Click **Create USB** and accept any End User License Agreement that is displayed. The USB flash drive is then formatted, and then the image is downloaded to it.

NOTE: You cannot cancel the process while the USB flash drive is being formatted, but you can cancel at any other time during the process by clicking **Abort**.

NOTE: Windows will detect the formatted USB flash drive as a 1 GB drive that uses the FAT32 file system. This is because the USB flash drive is formatted with two partitions. The FAT32 partition contains the boot instructions. A second partition, which uses the NTFS file system, contains the actual image but will not be detected by Windows when you are viewing the drive contents.

5. When the process is complete, do one of the following:
   - If you are running HP ThinUpdate on a thin client, you will be prompted to install the image on that thin client. Click either **Yes** or **No**.
   - If you are running HP ThinUpdate on a standard desktop or notebook computer, remove the USB flash drive, insert it into the thin client you want to re-image, and then restart the thin client.

D Device management

The t420 includes a license for HP Device Manager and has a Device Manager agent pre-installed. HP Device Manager is a thin client optimized management tool used to manage the full life cycle of HP thin clients to include Discover, Asset Management, Deployment and Configuration. For more information on HP Device Manager, please visit www.hp.com/go/hpdm.

If you wish to manage the t420 with other management tools such as Microsoft SCCM or LANDesk, go to www.hp.com/go/clientmanagement for more information.

E Adding an Image Restore Tool

1. Ensure that the boot order is set to use the **Network** as the first boot device.
2. Ensure that IBR.exe (Image Restore) and Flash.dd are stored in the same directory on the server. (e.g., `c:\program files\altiris\express\deployment server\images`)
3. From the Altiris Deployment Server Console, click **File > New > Job** .
4. Enter a unique name for the job that you will use to deploy the original thin client image.
5. Click the name of the new job.
6. Near the upper right side of the screen, click **Add**.
7. Select **Run Script** from the menu.
8. Type [full path]images\ibr\exe-y\images\flash.xx hd0

   NOTE: Linux uses the file name FLASH.DD while other operating system images use FLASH.IMG

9. Under **In which OS would you like to run this script?** Click **DOS**.
10. Click **Finish**.
11. You can now drag and drop the job onto the appropriate machine(s) or schedule it to run later, depending on your needs. Refer to the documentation for Altiris Deployment Solution (http://www.altiris.com/support/documentation) for more detailed information.

F System BIOS

Updating or restoring a BIOS

HP Device Manager

HP Device Manager can be used to update the BIOS of a thin client. Customers can use a pre-built BIOS add-on or can use the standard BIOS upgrade package along with an HP Device Manager File and Registry template. For more information on HP Device Manager File and Registry templates, review the *HP Device Manager User Guide* found at www.hp.com/go/hpdm.

Windows BIOS Flashing

You can use the BIOS Flash Update SoftPaq to restore or upgrade the system BIOS. Several methods for changing the BIOS firmware stored on your computer are available.

The BIOS executable is a utility designed to flash the System BIOS within a Microsoft Windows environment. To display the available options for this utility, launch the executable file under the Microsoft Windows environment.

You can run the BIOS executable with or without the USB storage device. If the system does not have a USB storage device installed, the BIOS update will perform under the Microsoft Windows environment and followed by system reboot.

Linux BIOS Flashing

You can use the hp-flash utility and its associated driver to update the BIOS on systems running Linux. After the driver loads, execute the utility from a command prompt with administrator privileges. The HP ThinPro or HP Smart Client Linux OS images include the utility for updating the BIOS, but the binary file to flash must be copied from the DOS Flash folder to the unit. Review the README.txt file for more specific instructions in the SoftPaq. The Linux Flash folder also contains the files necessary to build the BIOS flash driver module for the particular kernel being used; the hp-flash utility is not kernel-dependent other than the choice of 32-bit (i686) and 64-bit (x86_64) flavors.

BootBlock Emergency Recovery Mode

In the event of a failed BIOS update (for example if power is lost while updating), the System BIOS may become corrupted. BootBlock Emergency Recovery Mode detects this condition and automatically searches the root directory of the hard drive and any USB media sources for a compatible binary image. Copy the binary (.bin) file in the DOS Flash folder to the root of the desired storage device, and then power on the system. Once the recovery process locates the binary image, it attempts the recovery process. The automatic recovery continues until it successfully restores or updates the BIOS. If the system has a BIOS Setup password, you may need to use the Startup Menu / Utilities submenu to flash the BIOS manually after providing the password. Sometimes there are restrictions on which BIOS versions are allowed to be installed on a platform. If the BIOS that was on the system had restrictions, then only allowable BIOS versions may be used for recovery.

G Power cord set requirements

The power supplies on some computers have external power switches. The voltage select switch feature on the computer permits it to operate from any line voltage between 100-120 or 220-240 volts AC. Power supplies on those computers that do not have external power switches are equipped with internal switches that sense the incoming voltage and automatically switch to the proper voltage.

The power cord set received with the computer meets the requirements for use in the country where you purchased the equipment.

Power cord sets for use in other countries must meet the requirements of the country where you use the computer.

General requirements

The requirements listed below are applicable to all countries:

1. The power cord must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set will be installed.
2. The power cord set must have a minimum current capacity of 10A (7A Japan only) and a nominal voltage rating of 125 or 250 volts AC, as required by each country's power system.
3. The diameter of the wire must be a minimum of 0.75 mm_2 or 18AWG, and the length of the cord must be between 1.8 m (6 feet) and 3.6 m (12 feet).

The power cord should be routed so that it is not likely to be walked on or pinched by items placed upon it or against it. Particular attention should be paid to the plug, electrical outlet, and the point where the cord exits from the product.

⚠ **WARNING!** Do not operate this product with a damaged power cord set. If the power cord set is damaged in any manner, replace it immediately.

Japanese power cord requirements

For use in Japan, use only the power cord received with this product.

⚠ **CAUTION:** Do not use the power cord received with this product on any other products.

Country-specific requirements

Additional requirements specific to a country are shown in parentheses and explained below.

Country	Accrediting Agency	Country	Accrediting Agency
Australia (1)	EANSW	Italy (1)	IMQ
Austria (1)	OVE	Japan (3)	METI
Belgium (1)	CEBC	Norway (1)	NEMKO
Canada (2)	CSA	Sweden (1)	SEMKO
Denmark (1)	DEMKO	Switzerland (1)	SEV
Finland (1)	SETI	United Kingdom (1)	BSI
France (1)	UTE	United States (2)	UL
Germany (1)	VDE		

1. The flexible cord must be Type HO5VV-F, 3-conductor, 0.75mm_2 conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it will be used.
2. The flexible cord must be Type SVT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15A, 125V) or NEMA 6-15P (15A, 250V) configuration.
3. Appliance coupler, flexible cord, and wall plug must bear a “T” mark and registration number in accordance with the Japanese Dentori Law. Flexible cord must be Type VCT or VCTF, 3-conductor, 0.75 mm_2 conductor size. Wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7A, 125V) configuration.

H Statement of Volatility

Thin Client products typically have three types of memory devices namely, RAM, ROM, and Flash memory devices. Data stored in the RAM memory device will be lost once the power is removed from the device. RAM devices could be powered by main, aux, or battery power (power states are explained below). Therefore, even when the unit is not connected to an AC outlet, some of the RAM devices could be powered by battery power. Data stored in the ROM or Flash memory devices will retain its data even if the power is removed to the device. Manufacturers of Flash device usually specify a period of time (in the order of 10 years) for data retention.

Definition of power states:

Main Power: Power available when the unit is turned on.

Aux or Standby power: Power available when the unit is in off state when the power supply is connected to an active AC outlet.

Battery Power: Power from a coin battery present in the Thin Client systems.

The table below lists the available memory devices and their types per the models. Please note that the Thin Client systems do not use traditional hard drives with moving parts. Instead, they use flash memory devices with an IDE front end interface. Hence, the operating systems interface with these flash devices similar to a regular IDE hard drive. This IDE flash device contains the image of the operating system. The flash device can only be written by an administrator. A special software tool is required to format the flash devices and clear the data stored in them.

Please find below a list of steps that should be taken to update BIOS and use it to set the BIOS settings to factory default settings.

1. Download the latest BIOS (system ROM) from the HP website.
2. Follow the instructions to flash the BIOS that are found on the website.

   Flashing the BIOS will reset it back to factory settings.
3. Turn on the system, and while system is powering on, and after the HP splash screen, press the F10 key to enter BIOS setup screen.
4. If the Ownership Tag or Asset Tag is set, manually clear it under **Security > System Ids**.
5. Select **File > Save Changes and Exit**.
6. To clear the Setup or Power-On passwords if set, and clear any other settings, power down the computer and remove the AC power cord and the computer hood.
7. Locate the (blue/green) two pin password jumper on header E49 (labeled PSWD) and remove it.
8. Remove the AC power, wait 10 seconds until the unit AC power has drained out, then press the clear CMOS button. This is typically a yellow push button (labeled CMOS).
9. Replace the hood and AC power cord and turn the computer on. The passwords are now cleared and all other user-configurable, non-volatile memory settings are reset to their factory default values.
10. Enter the F10 setup utility.
11. Select **File > Default Setup > Restore Factory Settings as Default**. This will set the default settings back to the factory defaults.

12. Select **File > Apply Defaults and Exit**.

13. Shut down the computer, remove the AC power cord and place the (blue/green) jumper back on header E49. Replace the computer hood and power cord.

Model	Description	Location/Size	Power	Loss of data	Comments
t420	System Boot ROM (BIOS)	SPI ROM (64 Mbit) socketed, removable.			
	System memory (RAM)	SODIMM socket. Removable (4GB/ 8GB)	Main power	If main power is removed	Only S0/S3/S5/G3 ACPI states are supported
	RTC (CMOS) RAM	RTC RAM is 256 bytes RAM Memory embedded in AMD APU's System on Chip (SOC).	Main/battery	If battery power is removed	
	Keyboard/mouse (ROM)	2k bytes embedded in the super I/O controller (SIO12)	Main		
	Keyboard/mouse (RAM)	256 bytes embedded in the super I/O controller (SIO12)	Main	If main power is removed	

The information contained herein is subject to change without notice.

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

If you require additional information or need assistance please contact Charlie Shaver at 281-518-7453.

I Electrostatic discharge

A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

Preventing electrostatic damage

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded Thin Client chassis. Wrist straps are flexible straps of 1 megohm +/- 10 percent resistance in the ground cords. To provide proper grounding, wear the strap snug against the skin.
- Use heelstraps, toestraps, or bootstraps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, contact an HP authorized dealer, reseller, or service provider.

NOTE: For more information about static electricity, contact an HP authorized dealer, reseller, or service provider.

J Specifications

Dimensions		
Width (side to side)	180 mm	7.1 in
Height (top to bottom)	35 mm	1.4 in
Depth (front to back)	140 mm	5.5 in
Approximate Weight	740 g	1.63 lbs
Temperature Range (fanless design)*		
Operating**	10° to 35°C	50° to 95°F
(max. rate of change is 10°C per hour or 18°F per hour)		
Nonoperating	-30° to 60°C	-22° to 140°F
(max. rate of change is 20°C per hour or 36°F per hour)		
*Specifications are at sea level with altitude derating of 1°C/300 m (1.8°F/1000 ft) to a maximum of 3 Km (10,000 ft), with no direct, sustained sunlight. Upper limit may be limited by the type and number of options installed.	** The operating temperature range when the thin client is attached to a flat panel using the HP Quick Release is 10° to 35°C (50° to 95°F).	
Relative Humidity (non-condensing)		
Operating		10–90%
(max. wet bulb temperature is 28°C or 84.2°F)		
Nonoperating		5–95%
(max. wet bulb temperature is 38.7°C or 101.6°F)		
Maximum Altitude (unpressurized)		
Operating	3048 m	10,000 ft
(max. allowed rate of change is 457 m per minute or 1500 ft per minute)		
Nonoperating	9144 m	30,000 ft
(max. allowed rate of change is 457 m per minute or 1500 ft per minute)		
Power Supply		
Operating Input Voltage Range		100–240 VAC
Rated Line Frequency		50–60 Hz
Power Output (maximum)		45 W
Rated Output Current (maximum)		2.31 A
Output Voltage		+19.5 V DC

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